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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,180	11/14/2003	Peter C. Rieke	50005-162	9390
32215	7590	04/18/2006	EXAMINER	
KLARQUIST SPARKMAN, LLP 121 SW SALMON STREET, SUITE 1600 ONE WORLD TRADE CENTER PORTLAND, OR 97204			LEWIS, BEN	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 04/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/714,180

Applicant(s)

RIEKE ET AL.

Examiner

Ben Lewis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-95 is/are pending in the application.
- 4a) Of the above claim(s) 20-95 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6/01/04.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_.

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## DETAILED ACTION

### *Election/Restrictions*

Applicant's election of the species drawn to a solid oxide fuel cell (readable on claims 1-19) in the reply tiled on 3/22/2006 is acknowledged. Claims 20-95 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made without traverse in the reply filed on 3/22/2006.

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-8 are rejected under 35 U.S.C. 102(e) as being anticipated by Tao et al. (U.S. Pub. No. 2002/0015871 A1).

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With respect to claims 1-7, Tao et al teaches that the present invention relates to an electrochemical device that can operate either as a fuel cell or a battery (Paragraph 002). In the specific embodiment shown in FIG. 1, the electrodes (anode 4 and cathode 6) and electrolyte 5 are shown as solid-state layers in which electrolyte layer 5 is disposed between and contacting anode layer 4 and cathode layer 6 (Paragraph 0063). Another example of a solid state cathode is a perovskite-type oxide having a general structure of  $ABO_3$ , where "A" and "B" represent two cation sites in a cubic crystal lattice. A specific example of a perovskite-type oxide has a structure  $La_xMn_yA_aB_bC_cO_d$  where A is an alkaline earth metal, B is selected from the group consisting of scandium, yttrium and a lanthanide metal, C is selected from the group consisting of titanium, vanadium, chromium, iron, cobalt, nickel, copper, zinc, zirconium, hafnium, aluminum and antimony, x is from 0 to about 1.05, y is from 0 to about 1, a is from 0 to about 0.5, b is from 0 to about 0.5, c is from 0 to about 0.5 and d is between about 1 and about 5, and at least one of x, y, a, b and c is greater than zero. (Paragraph 0076).

With respect to claim 8, Tao et al teach that a specific example of a perovskite-type oxide has a structure  $La_xMn_yA_aB_bC_cO_d$  where C is selected from the group consisting of titanium, vanadium, chromium, iron, cobalt, nickel, copper, zinc, zirconium, hafnium, aluminum and antimony (Paragraph 0076).

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With respect to claims 9 and 10, Tao et al teaches that an example of a solid state cathode is a perovskite-type oxide having a general structure of  $ABO_3$ , where "A" and "B" represent two cation sites in a cubic crystal lattice. A specific example of a perovskite-type oxide has a structure  $La_xMn_yA_aB_bC_cO_d$  where A is an alkaline earth metal, B is selected from the group consisting of scandium, yttrium and a lanthanide metal, C is selected from the group consisting of titanium, vanadium, chromium, iron, cobalt, nickel, copper, zinc, zirconium, hafnium, aluminum and antimony, x is from 0 to about 1.05, y is from 0 to about 1, a is from 0 to about 0.5, b is from 0 to about 0.5, c is from 0 to about 0.5 and d is between about 1 and about 5, and at least one of x, y, a, b and c is greater than zero. (Paragraph 0076).. The instant specification recites: In one embodiment, the copper-substituted ferrite cathode exhibits a polarization resistance of from about 0.03 to about 0.50 Ohm-cm<sup>2</sup> at 650 °C in air. In another embodiment, the copper-substituted ferrite cathode exhibits a polarization resistance of 0.06 Ohm-cm<sup>2</sup> at 650 °C in C in air (Page 23 lines 10-22). Tao et al et al do not disclose any polarization resistance data. However, it is the position of the examiner that such properties are inherent, given that Tao et al and the present application utilize the same copper-substituted ferrite cathode material comprising the same elements. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999).

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With respect to claim 11, Tao et al teaches that in the specific embodiment shown in FIG. 1, the electrodes (anode 4 and cathode 6) and electrolyte 5 are shown as solid-state layers in which electrolyte layer 5 is disposed between and contacting anode layer 4 and cathode layer 6 (Paragraph 0063).

With respect to claims 15 and 16, Tao et al teach that another example of a solid state cathode "entire cathode" is a perovskite-type oxide having a general structure of  $ABO_3$ , where "A" and "B" represent two cation sites in a cubic crystal lattice. A specific example of a perovskite-type oxide has a structure  $La_xMn_yA_aB_bC_cO_d$  where A is an alkaline earth metal, B is selected from the group consisting of scandium, yttrium and a lanthanide metal, C is selected from the group consisting of titanium, vanadium, chromium, iron, cobalt, nickel, copper, zinc, zirconium, hafnium, aluminum and antimony, x is from 0 to about 1.05, y is from 0 to about 1, a is from 0 to about 0.5, b is from 0 to about 0.5, c is from 0 to about 0.5 and d is between about 1 and about 5, and at least one of x, y, a, b and c is greater than zero (Paragraph 0076).

With respect to claims 18, Tao et al teach that another example of a solid state cathode "entire cathode" is a perovskite-type oxide having a general structure of  $ABO_3$ , where "A" and "B" represent two cation sites in a cubic crystal lattice. A specific example of a perovskite-type oxide has a structure  $La_xMn_yA_aB_bC_cO_d$  where A is an alkaline earth metal, B is selected from the group consisting of scandium, yttrium and a lanthanide metal, C is selected from the

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group consisting of titanium, vanadium, chromium, iron, cobalt, nickel, copper, zinc, zirconium, hafnium, aluminum and antimony, x is from 0 to about 1.05, y is from 0 to about 1, a is from 0 to about 0.5, b is from 0 to about 0.5, c is from 0 to about 0.5 and d is between about 1 and about 5, and at least one of x, y, a, b and c is greater than zero. More specific examples of perovskite-type oxides include  $\text{La}_{0.84}\text{Sr}_{0.16}\text{Mn}_{0.8}\text{Fe}_{0.2}\text{O}_3$  (Paragraph 0076).

With respect to claims 19, Tao et al teach that in one embodiment, the stack can further comprise an interconnect positioned adjacent the anode of a first device and the cathode of the second device. In one embodiment, the interconnect comprises substantially the same material as the cathode, and thus the respective thermal coefficients would theoretically differ by about 0% (Paragraph 0105).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tao et al. (U.S. Pub. No. 2002/0015871 A1) as applied to claims 1-11 above and further in view of Seabaugh et al. (U.S. Patent No. 6,803,138 B2).

With respect to claim 12, Tao et al. teach a solid state cathode in paragraph 2 above. Tao et al. do not specifically teach an interlayer between said electrolyte layer and said cathode layer. However, Seabaugh et al. teach a ceramic electrolyte coating method wherein there are also advantages of applying interlayer films between the porous support electrode plate (either the LSM cathode or the NiO/YSZ anode) and the deposited electrolyte (YSZ) film. The purpose of such interlayer films could be either to increase performance (e.g. by incorporating catalytic materials that enhance electrochemical reactions or by locally reducing the size of particles and pores so that the density of electrochemical reaction sites is increased), or to prevent adverse chemical reactions between the support electrode and deposited film during sintering or co-sintering. A good example of interlayer materials include lanthanide doped cerium oxide ceramic electrolyte materials, and mixtures of ceria-based electrolytes with other materials (such as catalytic metals for anode interlayer films, and/or praseodymium manganite based perovskite ceramics for cathode interlayer films) (Col 4 Lines 47-67). Therefore it would have been obvious to one of ordinary skill in the art to incorporate the interlayer of Seabaugh et al into the fuel cell of Tao et al. because Seabaugh et al teach that, the purpose of such interlayer films could be either to increase performance (e.g. by incorporating catalytic materials that enhance electrochemical reactions or by locally reducing



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the size of particles and pores so that the density of electrochemical reaction sites is increased), or to prevent adverse chemical reactions between the support electrode and deposited film during sintering or co-sintering (Col 4 Lines 47-67).

5. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao et al. (U.S. Pub. No. 2002/0015871 A1) as applied to claims 1-11 above and further in view of Sarkar et al. (U.S. Patent No. 6,893,762 B2).

With respect to claims 13 and 14, Tao et al. teach a solid state cathode in paragraph 2 above. Tao et al. do not specifically teach wherein the copper-substituted ferrite material comprises a layer having a thickness of from about 1 to about 50 microns. However, Sarkar et al. discloses a metal-supported tubular micro-fuel cell wherein the inner electrode layer may be an anode and have a thickness of between 1 and 20 microns. The outer electrode layer may be a cathode and have a thickness of between 1 and 30 microns (Col 2 lines 25-30). Therefore it would have been obvious to one of ordinary skill in the art to incorporate the thin cathode layer of Sarkar et al into the fuel cell of Tao et al. because Sarkar et al teach that a fuel cell having such dimensions and materials are thin-walled tubular micro-fuel cells that are expected to have better thermal shock resistance and mechanical flexibility than larger-diameter thicker-walled ceramic tubular fuel cells (Col 2 lines 47-54).

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6. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tao et al. (U.S. Pub. No. 2002/0015871 A1) as applied to claims 1-11 above and further in view of Wallin et al. (U.S. Patent No. 6,548,203 B2).

With respect to claim 17, Tao et al. do not specifically teach wherein the cathode layer comprises a substantially homogenous mixture of a copper-substituted ferrite material and a finely-divided form of a second material. However, Wallin et al. discloses a cathode composition for solid oxide fuel cells wherein the present invention covers the use of a high performance electrocatalyst, based on transition metal perovskites of praseodymium, samarium, terbium or neodymium, which react with YSZ to form a product which is itself active as the cathode in a fuel cell (Col 2 lines 24-42). Wallin et al also teach that the electrode structure of the invention may be prepared by any suitable method. For example, an unsintered mixture of stabilized zirconia and cobaltite of praseodymium, samarium, terbium, or neodymium may be deposited on a layer comprising a sintered or unsintered ionically-conductive electrolyte material, and then sintered, to ensure sufficient contact between the layers. In another embodiment, a porous layer of stabilized zirconia particles is infiltrated with a slurry of the cobaltite particles (or a solution precursor thereof), under conditions sufficient to distribute the cobaltite particles "a finely divided form of a second material" in the porous layer of zirconia particles. In another embodiment, a layer of a mixture of stabilized zirconia and a different electrically-conductive material is deposited on a layer of ionically-conductive electrolyte material, sintered, and then infiltrated with a slurry of the cobaltite particles (or a

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solution precursor) different from the electrically-conductive material, under conditions sufficient to disperse the cobaltite particles (Col 3 lines 25-56).

Therefore it would have been obvious to one of ordinary skill in the art to incorporate the cobaltite particles of Wallin et al into the fuel cell of Tao et al because Wallin et al teach that according to the present invention, it is shown that a single infiltration of  $\text{PrCoO}_3$  into a cell containing YSZ-LSM as the cathode support gives cells that have both high performance and good reliability (Col 4 lines 30-50).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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